

**Virginia Electric and Power Company  
Surry Power Station  
5570 Hog Island Road  
Surry, Virginia 23883**

December 5, 2006

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D. C. 20555-0001

Serial No.: 06-1023  
SPS: JSA/BAG  
Docket No.: 50-280  
50-281  
License No.: DPR-32  
DPR-37

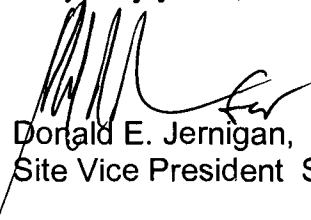
Dear Sirs:

Pursuant to 10CFR50.73, Virginia Electric and Power Company hereby submit the following Licensee Event Report applicable to Surry Power Station Units 1 and 2.

Report No. 50-280, 50-281/2006-002-00

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,

  
Donald E. Jernigan,  
Site Vice President Surry Power Station

Enclosure

Commitments contained in this letter:

1. Modify the Unit 1 OPC circuits to disable the Overspeed and LDA circuits.
2. The configuration of the Unit 1 and 2 tail pipes on the cross-under safety valves or Turbine Building siding near the cross-under safety valves will be permanently modified to prevent the steam discharge from pulling the siding away from the turbine building should the safeties lift.

JE22

cc: United States Nuclear Regulatory Commission  
Region II  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street, SW, Suite 23T85  
Atlanta, Georgia 30303-8931

Mr. N. P. Garrett  
NRC Senior Resident Inspector  
Surry Power Station

<b>NRC FORM 366</b> <b>COMMISSION</b> (6-2004)		<b>U.S. NUCLEAR REGULATORY</b>		APPROVED BY IMB: NO. 3150-0104		EXPIRES 06/30/2007																																										
<b>LICENSEE EVENT REPORT (LER)</b>  (See reverse for required number of digits/characters for each block)				Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.																																												
<b>1. FACILITY NAME</b> Surry Power Station, Unit 2				<b>2. DOCKET NUMBER</b> 05000 - 281		<b>3. PAGE</b> 1 OF 6																																										
<b>4. TITLE</b> Spurious Actuation Results in Unit 2 Trip and Loss of Offsite Power																																																
<b>5. EVENT DATE</b>			<b>6. LER NUMBER</b>			<b>7. REPORT DATE</b>			<b>8. OTHER FACILITIES INVOLVED</b>																																							
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER																																						
10	07	2006	2006 — 002 — 00			12	05	2006	Surry Power Station, Unit 1	05000 - 280																																						
									FACILITY NAME	DOCKET NUMBER																																						
										05000																																						
<b>9. OPERATING MODE</b>  N			<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>																																													
<b>10. POWER LEVEL</b>  100%			<table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> 20.2201(b)</td> <td><input type="checkbox"/> 20.2203(a)(3)(i)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(C)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)</td> </tr> <tr> <td><input type="checkbox"/> 20.2201(d)</td> <td><input type="checkbox"/> 20.2203(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(1)</td> <td><input type="checkbox"/> 20.2203(a)(4)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(B)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(i)</td> <td><input type="checkbox"/> 50.36(c)(1)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(iii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ix)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(ii)</td> <td><input type="checkbox"/> 50.36(c)(1)(ii)(A)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(x)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iii)</td> <td><input type="checkbox"/> 50.36(c)(2)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(A)</td> <td><input type="checkbox"/> 73.71(a)(4)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iv)</td> <td><input type="checkbox"/> 50.46(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(B)</td> <td><input type="checkbox"/> 73.71(a)(5)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(v)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(C)</td> <td><input type="checkbox"/> OTHER</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(vi)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(D)</td> <td colspan="2" style="font-size: x-small;">Specify in Abstract below or in NRC Form 366A</td> </tr> </table>									<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A	
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)																																													
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)																																													
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)																																													
<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)																																													
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)																																													
<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)																																													
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)																																													
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER																																													
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A																																													
<b>12. LICENSEE CONTACT FOR THIS LER</b>																																																
NAME  Donald E. Jernigan, Site Vice President									TELEPHONE NUMBER (include Area Code)  (757) 365-2001																																							
<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b>																																																
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX																																							
X	JJ	SIC	W120	N																																												
<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO									<b>15. EXPECTED SUBMISSION DATE</b>																																							
									MONTH	DAY	YEAR																																					
<b>ABSTRACT</b> (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)  On October 7, 2006, at 1711 hours, with Units 1 and 2 at 100% power, Unit 2 reactor was manually tripped when the Main Control Room received alarms associated with steam flow and feed flow mismatch and a report of a steam leak in the Turbine Building. The Unit 2 cross-under safety valves lifted unexpectedly causing Turbine Building siding to detach and contact Reserve Station Service Transformer (RSST) components. This resulted in faults and lockouts that de-energized two transfer busses, two Unit 2 reactor coolant pumps (RCPs), the Unit 2 containment air monitor, and caused the loss of offsite power to a Unit 2 and both Unit 1 emergency buses. Emergency systems functioned as designed, including the Reactor Protection System, Emergency Diesel Generators, and Auxiliary Feedwater System. Unit 1 was reduced to 73% power and Unit 2 was stabilized at hot shutdown. The cause of the event was a spurious signal from the Turbine Overspeed Protection Circuit (OPC). Modification of the OPC circuit will prevent recurrence during power operation. There were no significant safety consequences associated with this event. This report is provided pursuant to 10 CFR 50.73(a)(2)(iv)(A) for the automatic actuation of the Unit 2 RPS and AFW system, and 10 CFR 50.73(a)(2)(i)(B) for the loss of power to one emergency bus, two Unit 2 RCPs, and the Unit 2 containment air monitor.																																																

## LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Surry Power Station Unit 2	05000- 281	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 6
		2006	— 002	— 00	

17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

**1.0 DESCRIPTION OF THE EVENT**

On October 7, 2006, Units 1 and 2 were operating at 100% power when Unit 2 operators received indications of a secondary side transient. As a result, the operating team responded promptly by manually tripping Unit 2. The incident resulted in reportable events for both units as described in the following discussions.

Unit 2

At 17:11:18 on October 7, 2006, a spurious signal from the Unit 2 Turbine Overspeed Protection Circuit (OPC) [EIS-JJ] momentarily closed the turbine governor and intercept valves [EIS-TA-FCV]. When the OPC signal cleared, the governor valves re-opened immediately followed by the intercept valves opening a few seconds later. High Steam Flow, Steam Flow/Feed Flow Mismatch, Tave/Tref Deviation, and Steam Generator (SG) Level Error alarms were received in the main control room (MCR) for all three Unit 2 SGs. The Unit 2 cross-under safety valves [EIS-TA-FCV] located on both sides of the turbine building lifted causing portions of the Unit 2 Turbine Building siding [EIS-NM] to detach and contact the bus bars on two of the three Reserve Station Service Transformers (RSST) [EIS-EA]. As a result, power was lost to two of three transfer busses [EIS-EA-BU] that supply offsite power to the emergency busses, Unit 1 Emergency Busses 1J and 1H, and the Unit 2 Emergency Bus 2J. Emergency Diesel Generator (EDG) 1 [EIS-EK] started and restored power to the Unit 1 Emergency Bus 1H and EDG 3 started and restored power to the Unit 2 Emergency Bus 2J, as designed. Unit 1 Emergency Bus 1J remained de-energized. Unit 2 Emergency Bus 2H continued to be energized from offsite power.

At 17:11:37, within approximately 20 seconds of the initial alarms and after receiving a report of a steam leak in the turbine building, a conservative decision was made by the operating team to manually trip the Unit 2 reactor. The steam leak report was later determined to be associated with the lifting of the cross-under safety valves. Emergency systems functioned as designed, including the Reactor Protection System, Emergency Diesel Generators, and Auxiliary Feedwater System. The #4 Turbine Stop Valve [EIS-SB-V] did not indicate fully closed, which was later determined to be an indication problem, and the operating team responded by closing all three Unit 2 Main Steam Trip Valves (MSTVs) [EIS-SB-V] as directed by operating procedures. As a result, AFW and the SG pressure operated relief valves (PORVs) [EIS-SB-RV] were used to remove decay heat.

As a result of the power loss to the transfer busses, two of the three Unit 2 Reactor Coolant Pumps (RCPs) [EIS-AB-P] and the Unit 2 containment air radiation monitor were de-energized. In addition, when EDG 3 was transferred to Unit 1, the Unit 2

## LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Surry Power Station Unit 2	05000-281	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 of 6
		2006	— 002	— 00	

Emergency Bus 2J was de-energized. For the given unit conditions, Technical Specifications (TSs) require two reactor coolant system (RCS) loops to be operable, containment radiation monitoring to detect leakage, and two energized 4160V emergency busses. Therefore, due to the loss of power to the above equipment, a 30-hour clock to cold shut down (CSD) was entered in accordance with TS 3.0.1.

The loss of power to the RCPs also affected the Pressurizer spray flow capability and as a result, the operating team used the Pressurizer heaters [EIS-AB-EHTR] to control pressure by cycling the heaters on and off. At 17:59, a Pressurizer PORV [EIS-AB-RV] was briefly cycled open by the Pressurizer pressure master controller.

### Unit 1

The loss of power also affected the Unit 1 Condenser Air Ejectors [EIS-SG-SH] and resulted in a decrease in condenser vacuum. The operating team responded by initiating procedures for the loss of the Semi-Vital Bus [EIS-EC], starting the third condensate pump [EIS-SD-P], and reducing power to 73% power. With one emergency bus energized, as previously discussed, Unit 1 entered a 6-hour clock to hot shutdown (HSD) in accordance with TS 3.0.1. An attempt was made to energize the Unit 1 Emergency Bus 1J from the Alternate AC diesel generator (AAC DG) [EIS-EA], however, the load breaker would not close due to a design deficiency associated with a lockout signal from the RSST feed. At 19:11, EDG 3 was transferred from Unit 2 to the Unit 1 Emergency Bus 1J, stopping the 6-hour clock to HSD. At 21:54, the load breaker was reset and the Unit 1 Emergency Bus 1J was re-powered from the AAC DG.

A four-hour notification for the Unit 2 reactor protection system (RPS) activation and an eight-hour non-emergency notification for the Unit 2 AFW initiation were made to the NRC Operations Center at 23:10. This report is provided pursuant to 10 CFR 50.73(a)(2)(iv)(A) for the automatic actuation of the Unit 2 RPS and AFW system and 10 CFR 50.73(a)(2)(i)(B) for operation with one emergency bus on both Unit 1 and 2, operation with one Unit 2 reactor coolant loop, and the loss of containment air radiation monitor.

## **2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS**

The initial Unit 2 transient and subsequent lifting of the cross-under safety valves resulted in detached siding, causing faults and lockouts on the RSSTs. With offsite power lost to three of the four emergency busses, EDGs 1 and 3 automatically started and loaded, as designed, to re-power the Unit 1 Emergency Bus 1H and the Unit 2 Emergency Bus 2J. RSST 'B' was not damaged during the event and therefore, the Unit 2 Emergency Bus 2H remained operable with power to the emergency bus supplied from offsite. EDG 2 remained available to power the alternate bus.

## LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Surry Power Station Unit 2	05000- 281	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 of 6
		2006	— 002	— 00	

Although the transient did not last long enough to generate an automatic reactor or turbine trip signal, the operating team made a conservative decision to manually trip Unit 2 within 20 seconds of the initial alarms. Unit 2 was stabilized at HSD. Unit 1 was stabilized at reduced power using abnormal procedures. No operational errors occurred during event and the unit post trip safety system response was normal.

The above actuations and occurrences, including the loss of one emergency bus, is within the station design and therefore had no significant nuclear impact. The unit was brought to a safe condition in accordance with operating procedures, therefore, the health and safety of the public was not affected.

### 3.0 CAUSE

The reactor was manually tripped when the MCR received multiple alarms associated with steam flow and feed flow mismatch along with an invalid report of a steam leak in the turbine building. The cause for the perturbations in main steam flow, main steam pressure, and steam generator (SG) feedwater flow and level was a spurious actuation signal from the Unit 2 Turbine Overspeed Protection Circuit (OPC). The root cause for the spurious signal was not definitively determined, however, a connecting pin on the "speed channel A" card was found to be splayed, resulting in a loose connection. This is considered a possible cause for the spurious initiation of OPC.

The lifting of all of the cross-under safety valves caused the turbine building siding to detach. During the steam release from the safety valves, a vacuum was created between the tailpipe (due to the flow of steam) and the turbine building siding near the release. Engineering calculations concluded that the vacuum effect achieved during this event was in excess of the force required to detach the siding from the building.

### 4.0 IMMEDIATE CORRECTIVE ACTION(S)

Emergency busses were re-energized from offsite power after the Turbine Building siding was removed, RSSTs inspected, and repairs completed to the 'C' RSSTs components.

### 5.0 ADDITIONAL CORRECTIVE ACTIONS

Siding on the Unit 2 Turbine Building that was susceptible to safety valve discharge effects was removed.

Siding on the South side of the Unit 1 Turbine Building was temporarily reinforced as

## LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Surry Power Station Unit 2	05000- 281	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 of 6
		2006	— 002	— 00	

a conservative measure to prevent the siding from detaching and impacting the RSSTs in the event of future cross-under safety valve lifts.

A design change was implemented to permit loading the AAC DG on the emergency busses, upon a loss of offsite power, without having to locally reset lockout signals to the emergency bus breaker. A second design change was implemented to add a permissive signal to the Unit 2 OPC circuits that disabled this protective circuit when the main generator is synchronized on the grid, since protection is not needed in this condition.

## 6.0 ACTIONS TO PREVENT RECURRENCE

A design change will be completed during its next refueling outage to add a permissive signal to disable the Unit 1 OPC circuit when the main generator is synchronized on the grid.

The configuration of the Unit 1 and 2 tail pipes on the cross-under safety valves or Turbine Building siding near the cross-under safety valves will be permanently modified to prevent the steam discharge from pulling the siding away from the turbine building should the safeties lift.

## 7.0 SIMILAR EVENTS

A 1988 event involving a spurious OPC actuation (LER 50-281/1988-010-00) and a 2002 event involving a degraded EHC circuit card (LER 50-281/2002-003-00) resulted in unit trip, however, the cross-under safety valves did not lift. A preventive maintenance program was established to replace single point failure circuit cards on a routine frequency.

On June 6, 2006, during maintenance activities, Unit 1 experienced an over pressurization of the cross-under safety piping that caused the cross-under safety valves to lift on the North side of the Turbine Building. When the safeties lifted, Turbine Building siding detached from the area around the cross-under safety header. While the safety valves have lifted previously, the Turbine Building siding has not been impacted until this event. A cause evaluation for the June 2006 event determined that the safety valves lifted because the activity was performed at too high of a power level. To prevent recurrence, procedures will restrict these maintenance activities to a lower power level.

**LICENSEE EVENT REPORT (LER)**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Surry Power Station Unit 2	05000- 281	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 of 6
		2006	— 002	— 00	

**8.0 MANUFACTURER/MODEL NUMBER**

Overspeed Protection Circuit Card manufactured by Westinghouse referred to as a Speed Channel 'A' Card

**9.0 ADDITIONAL INFORMATION**

At 10:42 on 10/08/06, Unit 1 was returned to 100% reactor power. At 17:11 on 10/12/06, Unit 2 was placed in Cold Shutdown in preparation for the planned Refueling Shutdown that was scheduled to begin on 10/22/06.